AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A parity check matrix generation method, comprising:~~for generating parity check matrix H of m rows and n columns in low-density parity check code; wherein:~~

generating ~~said parity check matrix H is made up from~~ a partial matrix H1 of m rows and k columns ~~(where k = n - m)~~ and a ~~partial~~ unit matrix H2 of m rows and m columns; ~~and~~

determining positions of matrix elements "1" of each row of said partial matrix H1 ~~are determined~~ to satisfy conditions that, when any two rows contained in said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different., wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0"; and

generating a parity check matrix H of m rows and n columns (where k = n - m) in low density parity check code,

wherein said parity check matrix H is made up from said partial matrix H1 and said unit matrix H2, and

wherein a processor generates the partial matrix H1, the unit matrix H2 and the parity check matrix H.

2. (currently amended): The parity check matrix generation method according to claim 1, further comprising, ~~wherein:~~

determining a period list P={p(1), p(2), …, p(PL)} (where p(1)–p(PL) are relatively prime) ~~is determined~~; and

generating, for each of elements p(j) of said period list P, a maximum p(j) rows of partial matrix H1 ~~are generated~~ in which the periods are p(j) and the phases are different.

3. (original): The parity check matrix generation method according to claim 2, wherein elements from element p(2) to element p(PL) are generated based on leading element p(1).

4. (original): The parity check matrix generation method according to claim 3, wherein elements p(j) of period list P are generated such that elements p(j) are the smallest values among values that satisfy a condition of being relatively prime with all preceding elements from element p(1) to element p(j–1).

5. (original): The parity check matrix generation method according to claim 3, wherein elements p(j) of period list P are generated such that elements p(j) are the smallest values among values that each satisfy a condition of being a prime number greater than preceding element p(j–1).

6. (currently amended): ~~The parity check matrix generation method according to claim 1, wherein a unit matrix is generated as partial matrix H2.~~

A parity check matrix generation method, comprising:

generating a partial matrix H1 of m rows and k columns and a partial matrix H2 of m rows and m columns;

determining positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0";

determining the positions of matrix elements "1" within a lower triangle matrix such that the conditions are satisfied that, when any two rows contained within partial matrix H2 are selected, the periods of the two rows are relatively prime, or when the periods of the two rows are identical, their phases are different, wherein all the positions of matrix elements of the partial matrix H2 that are not determined as "1" are assigned a value of "0"; and

generating a parity check matrix H of m rows and n columns (where $k = n - m$) in low density parity check code,

wherein said parity check matrix H is made up from said partial matrix H1 and said partial matrix H2, and

wherein a processor generates the partial matrix H1, the partial matrix H2 and the parity check matrix H.

7. (canceled).

8. (currently amended): The parity check matrix generation method according to claim ~~7~~ 6, further comprising, ~~wherein:~~

determining a period list P={p(1), p(2), …, p(PL)} (where p(1)–p(PL) are relatively prime) ~~is determined~~; and

generating, for each of elements p(j) of said period list P, a maximum p(j) rows of partial matrix H2 ~~are generated~~ in which the periods are p(j) and the phases are different.

9. (original): The parity check matrix generation method according to claim 8, wherein elements from element p(2) to element p(PL) are generated based on leading element p(1).

10. (original): The parity check matrix generation method according to claim 9, wherein elements p(j) of period list P are generated such that elements p(j) are the smallest values among values that satisfy a condition of being relatively prime with all preceding elements from element p(1) to element p(j–1).

11. (original): The parity check matrix generation method according to claim 9, wherein elements p(j) of period list P are generated such that elements p(j) are the smallest values among values that each satisfy a condition of being a prime number greater than preceding element p(j–1).

12.-32 (cancelled)

33. (currently amended): An encoding device which, ~~for; based on prescribed parameters, using the parity check matrix generation method according to claim 1,~~

generates a partial matrix H1 of m row and k columns and a unit matrix H2 of m rows and m columns;

determines positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 to satisfy conditions that, when any two rows contained is said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different, wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0";

generates a parity check matrix H of m rows and n columns (where k = n - m) in low density parity check code, wherein said parity check matrix H is made up from said matrix H1 and said unit matrix H2; and

~~to generate a parity check matrix; and~~

~~using the generated parity check matrix to~~ performs low-density parity encoding, using the generated parity check matrix, to convert data to codewords, and transmit~~sting~~ the converted codewords to a decoding device by way of a transmission line.

34. (currently amended): A decoding device which ~~for:~~,

~~receiving~~ receives codewords from an encoding device by way of a transmission line;

generates a partial matrix H1 of m row and k columns and a unit matrix H2 of m rows and m columns;

determines positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 to satisfy conditions that, when any two rows contained is said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different, wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0";

generates a parity check matrix H of m rows and n columns (where k = n - m) in low density parity check code, wherein said parity check matrix H is made up from said matrix H1 and said unit matrix H2; and

~~and based on prescribed parameters, using the parity check matrix generation method according to claim 1, to generate a parity check matrix, and~~

~~using the generated parity check matrix to~~ decodes, using the generated parity check matrix, said received codewords, and converts to data that preceded encoding.

35. (original): A parity check matrix generation program for generating parity check matrix H of m rows and n columns in low-density parity-check code, said parity check matrix generation program causing a computer to execute processes of:

constructing said parity check matrix H from partial matrix H1 of m rows and k columns and partial matrix H2 of m rows and m columns (where m = n–k); and

determining positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different.

36. - 38. (canceled).

39. (currently amended): The parity check matrix generation method according to claim 2, wherein generating said partial matrix H2 comprises generating a unit matrix as said partial matrix H2.~~wherein a unit matrix is generated as partial matrix H2.~~

40. (currently amended): The parity check matrix generation method according to claim 3, wherein generating said partial matrix H2 comprises generating a unit matrix as said partial matrix H2.~~wherein a unit matrix is generated as partial matrix H2.~~

41. (currently amended): The parity check matrix generation method according to claim 4, wherein generating said partial matrix H2 comprises generating a unit matrix as said partial matrix H2.~~wherein a unit matrix is generated as partial matrix H2.~~

42. (currently amended): The parity check matrix generation method according to claim 5, wherein generating said partial matrix H2 comprises generating a unit matrix as said partial matrix H2.~~wherein a unit matrix is generated as partial matrix H2.~~

43-53 (cancelled)

54. (new): An encoding device which,

generates a partial matrix H1 of m row and k columns and a partial matrix H2 of m rows and m columns;

determines positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 to satisfy conditions that, when any two rows contained is said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are different, wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0";

determines positions of matrix elements "1" within a lower triangle matrix to satisfy conditions that, when any two rows contained within partial matrix H2 are selected, the periods of the two rows are relatively prime, or when the periods of the two rows are identical, their phases are different, wherein all the positions of matrix elements of the partial matrix H2 that are not determined as "1" are assigned a value of "0";

generates a parity check matrix H of m rows and n columns (where k = n - m) in low density parity check code, wherein said parity check matrix H is made up from said matrix H1 and said partial matrix H2; and

performs low-density parity encoding, using the generated parity check matrix, to convert data to codewords, and transmits the converted codewords to a decoding device by way of a transmission line.

55. (new): A decoding device which,

receives codewords from an encoding device by way of a transmission line;

generates a partial matrix H1 of m row and k columns and a partial matrix H2 of m rows and m columns;

determines positions of matrix elements "1" of each row of said partial matrix H1 to satisfy conditions that, when any two rows contained in said partial matrix H1 to satisfy conditions that, when any two rows contained is said partial matrix H1 are selected, periods of the two rows are relatively prime, or when the periods of the two rows are identical, phases are

different, wherein all the positions of matrix elements of the partial matrix H1 that are not determined as "1" are assigned a value of "0";

determines positions of matrix elements "1" within a lower triangle matrix to satisfy conditions that, when any two rows contained within partial matrix H2 are selected, the periods of the two rows are relatively prime, or when the periods of the two rows are identical, their phases are different, wherein all the positions of matrix elements of the partial matrix H2 that are not determined as "1" are assigned a value of "0";

generates a parity check matrix H of m rows and n columns (where k = n - m) in low density parity check code, wherein said parity check matrix H is made up from said matrix H1 and said partial matrix H2; and

decodes, using the generated parity check matrix, said received codewords, and converts to data that preceded encoding.